# OBSERVATIONS ON SOME OF THE COMMON PLANTS OF GUJARAT

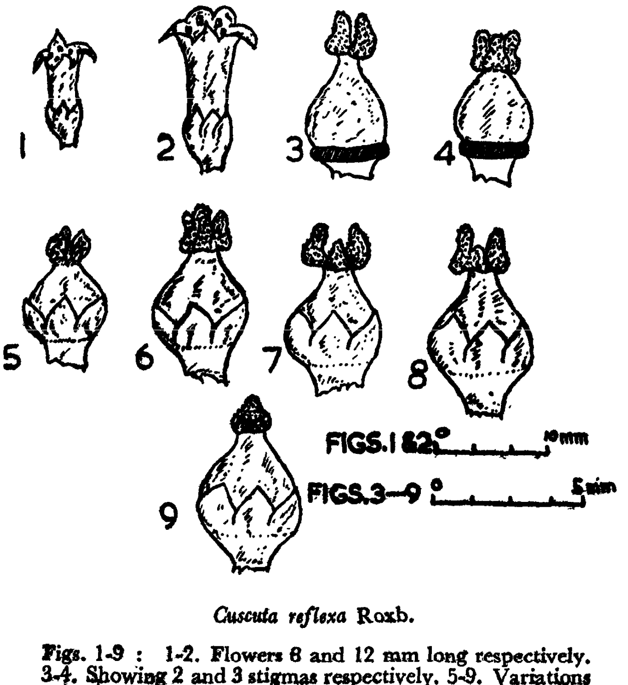
The importance of the revision of the provincial floras has been stressed by the leading botanists of the country. It is, therefore, imperative to study intensively different areas of a province to achieve this goal. From the available literature it appears that considerable work has been done in this direction. However, the authors feel that, in addition to collection of plants from different areas and their identification, it is necessary to examine all plants critically and to compare their descriptions with those in relevant floras and to note variations if any. When there are variations, and such variations occur in the flowers of the same plant, they may cause some confusion in the identification of plants with the help of the local floras. The confusion may become more so, when such variable characters are used as distinguishing points in the artificial keys in the floras and sometimes even in the monographs and revision of the genera or the families; hence a report on variations will be of taxonomical value, which will be useful at the time of revision of the provincial floras.

In a cursory study of the flowers of *Cuscuta reflexa* Roxb., *Cassia occidentalis* L. and *C. sophera* L. the authors found some variations while comparing their observations with the descriptions given in Cooke's Flora (1958). These observations prompted us to examine as many fresh buds and open flowers as possible of these plants in order to find out if the variations were casual or frequent; since the variations were frequent and, as far as the authors are aware, they have not been reported by any other worker dealing with the flora of different parts of erstwhile Bombay State, it is worthwhile to record them.

The material for the present study was collected from the area in vicinity of the University Campus, Vallabh Vidyanagar. In addition the following sheets were examined in the Blatter Herbarium, Bombay: *Cassia occidentalis* L.; BOMBAY: Bandra *Ackland* 232; Bombay Reclamation *Santapau* 102/1, 3/331; Madura district: Sirumali hills *Pallithanum* 755. *Cassia sophera* L.; GUJARAT: Broach *Shah* 854; Unai (Dangs Forest) *Santapau* 17177; BOMBAY: Victoria Gardens *Fernandez* 3564, 4351; Blatter Herbarium nos. 10054, 10085 without collector's name.

**Cuscuta reflexa** Roxb.

The present plant is included in the subgenus '*Monogynella*' by Clarke (1883) and he described the latter as 'ovary, and young fruit, narrowed upwards into a single short style with 2 long stigmas', implying thereby that 'two stigmas' is one of the differentiating characters. According to many other authors e.g. Cooke (1958), Gamble (1957), Duthie (1960) and Haines (1961) there are only two stigmas in this plant. Yuncker (1932) in his monograph on genus *Cuscuta* shows two stigmas in fig. 130 E-G. Santapau & Patel (1957) in their revision of the genus *Cuscuta* in Bombay also describe two stigmas for the present plant. From these references it appears that there are only two stigmas in the plant under consideration and probably it is an important character. In fact some authors like Gamble and Haines have used it in their keys as one of the distinguishing points to separate this species from other species in the genus *Cuscuta*. Johri and Tiagi (1951) who cursorily mention '2 or 3 lanceolate stigmas' for *C. reflexa*, are probably the first to mention a variation in the number of stigmas. During the course of our study we examined about hundred and fifty flowers; sixty flowers showed only two stigmas (Fig. 3), sixty one three stigmas (Fig. 4) whereas in the remaining flowers the stigmas were variously lobed (Figs. 5-9). The lobing in the two stigmas may be simultaneous (Figs. 5-6) simulating four stigmas, or one may be lobed, the other not (Fig. 8) resembling three stigmas. In some cases the lobes of the stigmas were unequal (Figs. 5, 7 and 9). These variations were seen in the flowers on the same plant.



*Cuscuta reflexa* Roxb.

Figs. 1-9 : 1-2. Flowers 8 and 12 mm long respectively. 3-4. Showing 2 and 3 stigmas respectively. 5-9. Variations due to lobing in the stigmas.

Our observations thus show that the number of stigmas is not constant, the variations being due to partial or complete lobe formation in the primarily two stigmas. In no case we have seen only one stigma or an incompletely lobed single stigma; but it is likely that the two stigmas may themselves be the product of original single stigma; this problem, however, may be settled only after a careful ontogenetic study of the flowers.

Since the character "two stigmas" is a variable one, the authors feel that it may not be used as a diagnostic character for *C. reflexa*.

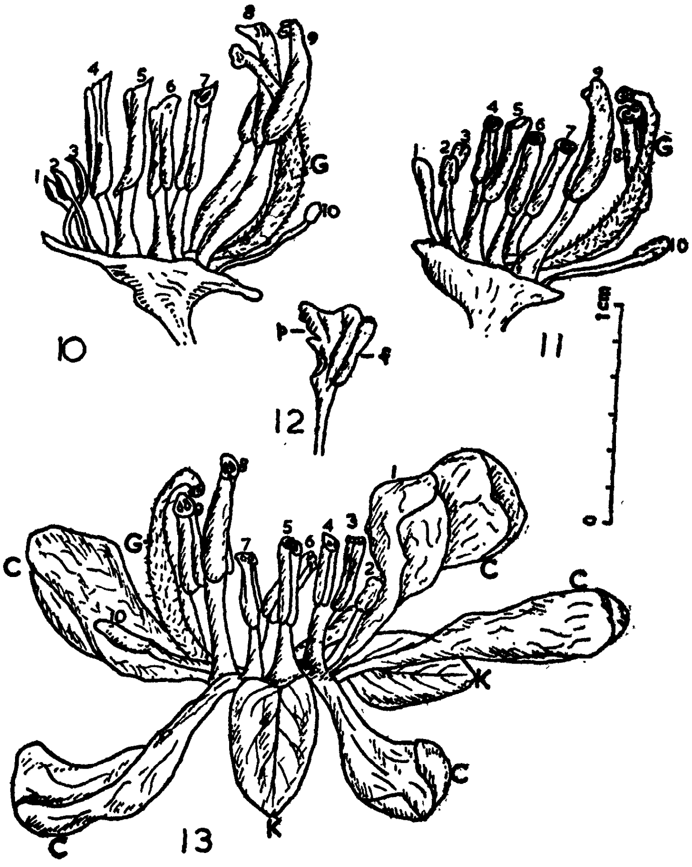
During the botanical explorations in many parts in vicinity of Bombay for about ten years one of us (Shah) found flowering of *C. reflexa* moderate, at times the branches producing only a few flowers. In the present area the flowering was profuse, most of the branches studded with numerous flowers. This is the main reason we could examine so many flowers and noted the variations. Further some of the flowers apparently looked longer than those of Bombay plants. Most of them were 8-10 mm long (Fig. 1) but a few measured about 12 mm long (Fig. 2) as compared to 6-8 mm and 8-10 mm long flowers described by Santapau & Patel and Yuncker respectively.

Yuncker and Santapau & Patel have listed several hosts for this plant. We add *Cajanus cajan* Millsp, *Canavalia gladiata* DC., *Capparis sepiaria* L., *Cassia siamea* Lamk., *Clerodendrum phlomidis* L. f., *Crotalaria burhia* Buch.-Ham., *Casuarina equisetifolia* Linn., *Euphorbia neriifolia* L., *E. tirucalli* L., *Lawsonia inermis* L., *Merremia aegyptia* Urb., *Millingtonia hortensis* L. f., *Ricinus communis* L. and *Thevetia peruviana* Merrill.

**Cassia occidentalis** L. and **C. sophera** L.

These plants are included by Baker (1878) in the subgenus *'Senna'* the stamen character of which, according to him is "perfect stamens 7, the anthers subequal or those of 2-3 lowest larger than the others; the posterior stamens are without anthers". Cooke (1958) considers "fertile stamens 7, the others reduced to staminodes" a distinguishing character in his key and includes these two plants under this key character. Recently Santapau (1962) also considered this character as an important point in the key given by him. According to Cooke and de Wit (1955) in both the plants there are ten stamens, of which three upper reduced to staminodes, the anthers of the remaining seven perfect, the three lower longer and with larger anthers than the four lateral ones. However, for *Cassia sophera* these authors also mention that one of the laterals is sometimes reduced to staminode, indicating the fertile laterals are three.

Twenty five flowers of *C. occidentalis* and thirty flowers of *C. sophera* collected from different plants, were critically examined. In all the flowers of both the plants there were only two longer fertile stamens and not three as mentioned by Cooke and de Wit. The herbarium sheet (*Ackland* 232), which bears remarks about the stamens also indicates that there are only two big stamens. This is due to one of the lower longer fertile stamen reduced to a staminode; it is usually the middle one, as can be judged from its position. It is more commonly overlooked in the flowers because of its position below the carpel which lies between the two lower longer anthers (Figs. 10 and 11).



*Cassia occidentalis* L. and *C. sophera* L.

Figs. 10-13 : 10-11. Portions of the flowers of *C. occidentalis* L. and *C. sophera* L. respectively showing the arrangements of the stamens and carpels. 12. A stamen with half fertile anther (f), the other half petaloid structure (p). 13. Flower with six petals. Note two anthers on a common filament. Stamen no. 3 not numbered.

(Nos. 1-3 upper sterile stamens; nos. 4-7 lateral fertile stamens; 8-9 lower longer fertile stamens and no. 10 lower longer sterile stamen. K—Sepal; C—Petal; G—Carpel.)

In addition to this, a few more variations about the number of fertile and sterile stamens are noted. They are as follows:

In all the twenty flowers of *Cassia occidentalis* examined, there are ten stamens; in twenty three flowers the fertile and sterile stamens are six and four respectively, the fertile ones being two longer and four laterals, the sterile ones, one lower longer and three upper. In two flowers the fertile and sterile stamens are five each, two lower longer and three lateral fertile, while one lower longer, one lateral and three upper sterile.

The flowers of *Cassia sophera* show more variations than those of *C. occidentalis.* Of the thirty flowers examined, in twenty eight flowers the number of stamens is ten. Of the remaining two, there are eleven stamens in one flower, the other has six petals. The sixth petal appears to be one of the modified upper sterile stamen (Fig. 13). In fig. 13 it will be also seen that the two anthers are on a common filament. This may be either due to the fusion of the filaments of one of the lateral stamens and one of the upper ones, which has become fertile, or it may be due to fusion between the two laterals, in which case, then, one of the upper sterile is missing. The former interpretation seems more appropriate to us [c. f. (b) below].

In twenty eight flowers with ten stamens the following variations are noted:

(a) In twenty flowers there are six fertile and four sterile stamens and their arrangement is the same as described in *C. occidentalis* above.

(b) Seven flowers showed fertile and sterile stamens seven and three respectively, the fertile stamens being two lower longer, four laterals and one upper and the sterile ones, one lower longer and two upper.

(c) In one flower five and half stamens are fertile and four and half sterile; here one of the laterals has only half anther fertile, the other half modified into a petaloid structure (Fig. 12); otherwise arrangement is the same as described in (a).

In the flower with eleven stamens, the number of fertile and sterile stamens is seven and four respectively, two lower longer and five lateral fertile, one lower longer and three upper sterile.

From the above observations it may be concluded that in most of the flowers of both the species there are ten stamens, but the number of fertile and sterile stamens is not constant as mentioned by Cooke and de Wit. Such variable characters, as far as possible, may not be used in the keys.

G. L. SHAH AND R. J. PATEL
*S. V. Vidyapeeth, Vallabh Vidyanagar, Gujarat*

### LITERATURE CITED

BAKER, J. G. Leguminosae in Sir J. D. Hooker's *The Flora of British India* 2 : 261, 1878.

CLARKE, C. B. Convolvulaceae in Sir J. D. Hooker's *The Flora of British India* 4:225, 1883.

COOKE, TH. *The Flora of the Presidency of Bombay.* Rep. ed. Calcutta, 1958.

DUTHIE, J. F. *Flora of the Upper Gangetic Plain and of the adjacent Siwalik and sub-Himalayan tracts.* Rep. ed. Calcutta, 1960.

GAMBLE, J. S. *Flora of the Presidency of Madras.* Rep. ed. Calcutta, 1957.

HAINES, H. H. *The Botany of Bihar and Orissa.* Rep. ed. Calcutta, 1961.

JOHRI, B. M. AND B. TIAGI. Floral morphology and seed formation in *Cuscuta reflexa* Roxb. *Phytomorphology* 2 : 162, 1951.

SANTAPAU, H. *The Flora of Saurashtra.* Saurashtra Res. Soc., Rajkot, 1962.

—— AND V. PATEL. The genus *Cuscuta* in Bombay. *J. Bombay nat. Hist. Soc.* 54 : 712, 1957.

WIT, DE H. C. D. A revision of the genus *Cassia* (Caesalp.) as occurring in Malaysia. *Webbia* 11 : 197-292, 1955.

YUNCKER, T. G. The genus *Cuscuta. Mem. Torrey bot. cl.* 18 : 206, 1932.

## NOTES ON SOME NEW DISTRIBUTION RECORDS FOR NORTH INDIA

**Alternanthera ficoidea** (Linn.) R. Br. ex R. & S. (Amaranthaceae).

A native of Brazil, first described from Bombay (Shrivastava & Santapau, J. Bomb. Nat. Hist. Soc. 52: (4), 957, 1954-55) and recently recorded from Mysore [Ramaswamy, Bull. Bot. Surv. India 6 (1): 7, 1964]. This is the first record for Northern India.

Dehra Dun. Near Tapkeshwar, gregariously growing along roadside, flowers whitish, throughout the year, fruit setting is extremely rare, C. R. Babu 35432, 7 Oct. 1964; 34695, 1 Jan. 1965.

**Astragalus scorpiurus** Bunge (Leguminosae).

This is the first report from Upper Gangetic Plain. Distributed mostly in drier parts of Punjab, N. W. F. Province, W. Pakistan, Baluchistan, Afghanistan [Ali, Kew Bull. 13 (2): 305, 1958].

Dehra Dun, Rispana. Rare in grassy places along river bed, flowers deep purple tinged with pink and changing to bluish on drying. Baker (Hooker; Fl. Brit. Ind. 2: 119, 1876), however, described flowers as yellowish tinged with rose purple, April—May, C. R. Babu 35206, 18 April, 1965.

**Ixeris sagittarioides** (Cl.) Stebbins (Compositae).

This is the first report from Upper Gangetic Plain. Distributed along higher elevations of Himalayas (Hooker, Fl. Brit. Ind. 3: 410, 1881).

Dera Dun. Rispana. Fairly common along ravines and in the undergrowth of *Shorea* forest, flowers yellow, April-May, C. R. Babu 35207, 18 April, 1965.

**Lepidium virginicum** Linn. (Cruciferae).

A native of North America and a new introduc-